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Global Research Publications Trends of Gestational Diabetes Mellitus: A Scientometric Analysis

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Abstract

Gestational Diabetes is high blood sugar that develops during pregnancy and can cause problems for both mother and baby, during and after birth. But the risk of these problems can be reduced if its detected and well managed. The paper attempts to analyze the studies done on Gestational Diabetes Mellitus (GDM) for the past 10 years. It includes document by affiliation, document by type and document by author. Scopus international multidisciplinary bibliographic database has been used to retrieve the 10 years covering the the year 2011-2020.

Keywords-*Scienometric analysis, Authorship pattern, Research Productivity, Gestational Diabetes Mellitus*

INTRODUCTION

Diabetes is a chronic disease that occurs when the pancreas is no longer able to make insulin, or when the body cannot make good use of the insulin it produces. Insulin is a hormone made by the pancreas, that acts like a key to let glucose from the food we eat pass from the blood stream into the cells in the body to produce energy.

Not being able to produce insulin or use it effectively leads to raised glucose levels in the blood (known as hyperglycaemia). Over the long-term high glucose levels are associated with damage to the body and failure of various organs and tissues.¹

TYPES OF DIABETES

There are three main types of diabetes – type 1, type 2 and gestational.

- i. Type 1 diabetes can develop at any age, but occurs most frequently in children and adolescents.
- ii. Type 2 diabetes is more common in adults and accounts for around 90% of all diabetes cases.
- iii. Gestational diabetes (GDM) is a type of diabetes that consists of high blood glucose during pregnancy and is associated with complications to both mother and child. GDM usually disappears after pregnancy but women affected and their children are at increased risk of developing type 2 diabetes later in life.

Diabetes Mellitus is a metabolic disorder that affects carbohydrate, fat and protein metabolism.² Today the majority of the women have Type 2 diabetes or diabetes during pregnancy. International Diabetes Federation says that the prevalence of high blood glucose in pregnancy increase rapidly with age and is highest in women of 45 in 2017.³

Women with history of Gestational Diabetes Mellitus have 35-60% of chance of developing type 2 diabetes mellitus. (CDC, 2011) and are 3.5 times more likely to develop Diabetes mellitus than individuals in the general population and with most of these women developing disease within 10 years of diagnosis of Gestational Diabetes Mellitus. Similarly, the rate of Gestational diabetes continues to escalate leading to poor maternal and foetal outcomes of pregnancy and lifelong health complications associated with impairment of glucose tolerance.

The treatment of Gestational Diabetes Mellitus is essential due to the increased rate of complication such as abortion, preterm labour, infection, increased incidence of preeclampsia, polyhydramnios, maternal distress, diabetic retinopathy, diabetic nephropathy, ketoacidosis, prolongation of labour, perineal injuries, postpartum hemorrhage, fetal macrosomia, congenital malformation, hypoglycemia, respiratory distress syndrome, hyperbilirubinemia, polycythemia, hypomagnesemia and cardiomyopathy.⁴

The first step in treating gestational diabetes is to modify the diet to help keep blood sugar level in the normal range, while eating a healthy diet. Most women with well controlled blood sugar deliver healthy babies without any complications.⁵

REVIEW OF LITERATURE

A scienometric analysis of evidence based studies on physical methods of rehabilitation of patients with osteoarthritis was conducted by applying quantitative methods. A set of 672 documents were obtained between 1900 and 2019. Year 2005 was turning point, western Europe and North America accounted for 80% of whole world production of literature. This study provided a picture of an emergent and interdisciplinary field that could be of interest to all stakeholders facing common challenges to promote data sharing in precision medicine. A scienometric study was conducted to improve this knowledge base for researchers working in microplastic and microbiological research. A total of 47 publications under analysis span from 2011 to 2018, and have been published in 23 journals, most of them interdisciplinary

journals that are available for a widespread audience from both complementary and diverse subject areas. Despite a short citation window, publications received 390 citations with a clear exponential pattern, showing a promising future for microplastic-microbiological research. Whether insofar, a researcher has been focused on either solely microplastics or microbiology, as these fields continue to collide as microplastic-microbiology interaction research continues to increase, this paper might illuminate the next steps for researchers preparing future publications.

Pregnancy is one of the wonderful and noble services imposed by nature which no women can shrink. It is a period of happiness, excitement, expectancy, anxiety and fear.⁶ Some common maternal health condition or problems a women may experience during pregnancy are Anemia, UTI, Mental health condition, Hypertension, Gestational Diabetes mellitus, Obesity and Weight gain, Infection, Hyper emesis gravidarum.⁷

Approximately one third of women diagnosed with type 2 diabetes have a history of GDM, which has been defined as carbohydrate intolerance by the Endocrine Society as hyperglycemia in pregnancy. The International Association of Diabetes and Pregnancy Study Groups (IADPSG) and the World Health Organization define GDM as hyperglycemia first detected during pregnancy. In some cases, hyperglycemia is detected for the first time in pregnancy in women with undiagnosed pre-gestational diabetes; therefore, it is important to screen all women with GDM after delivery to determine whether they meet criteria for diabetes outside of pregnancy.⁸

The main cause and risk factor of Gestational Diabetes Mellitus are age > 25 years, pre-gestational obesity or excessive weight gain during pregnancy, family history of diabetes, personal history of poor obstetric outcome such as polyhydramnios, macrosomia, pre-eclampsia, fetal malformation of an ethnic group with a high risk prevalence of diabetes and history of Diabetes Mellitus in previous pregnancy.⁹

Insulin resistance develops during the second trimester of pregnancy, and progresses during the third trimester. The development of insulin resistance is driven by several factors. The placenta secretes hormones and adipokines, including tumor necrosis factor, human placental lactogen, and human placental growth hormone, all of which have been implicated as mediators of insulin resistance in pregnancy.¹⁰ In addition, overweight, obesity, increased adiposity, increased caloric intake, and decreased exercise all play a part in insulin resistance. To compensate for the insulin resistance, the pancreas increases maternal insulin production; GDM is diagnosed when maternal insulin production cannot match the demand.¹¹

Diabetes during pregnancy has been associated with increased perinatal mortality, an increased rate of caesarean sections, significant risk of macrosomia, and other neonatal morbidities, including serious birth trauma, hypoglycemia, hypocalcemia, polycythemia and hyperbilirubinemia. Management is therefore directed toward reducing perinatal mortality and morbidity, a goal that may be achieved by maintaining close surveillance of the mother and fetus and stringent glucose control.¹²

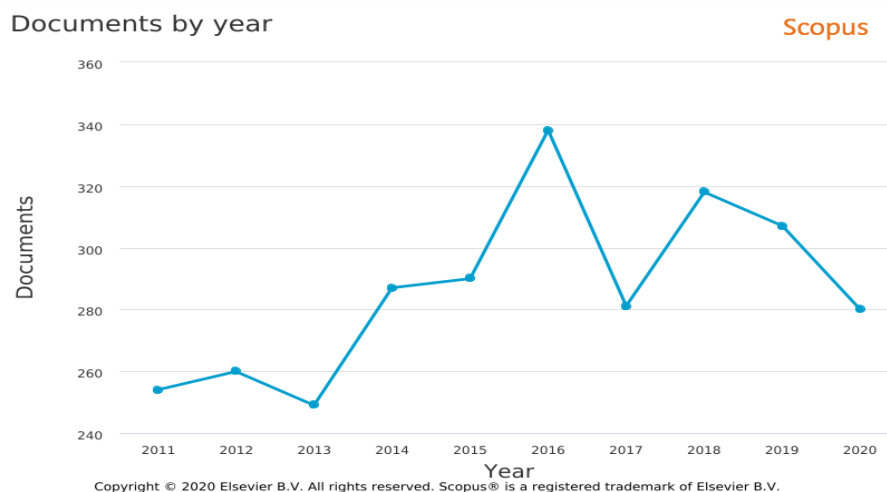
A study that conducted worldwide in 2015 regarding global estimates for hyperglycemia in pregnancy has brought out that 16.9% of total pregnancies were affected by some form of hypoglycemia. Out of these, South East Asia region had maximum prevalence at 25%.⁹ The reason behind this increased incidence rate are family history of Diabetes Mellitus, previous history of Gestational Diabetes Mellitus, recurrent Urinary Tract Infection and moniliasis, chronic hypertension, maternal age over 30 years and obesity.¹³

OBJECTIVES

The present studies general objective was to evaluate the publication output of Gestational diabetes Mellitus for the selected period from 2011 -2020. However the study intended to perform some specific objectives are as follows:

- i. To find out growth of research productivity of Gestational Diabetes mellitus
- ii. To identify the highly cited research publications and preferred source for publication.
- iii. To examine the document by affiliation of research publication during the selected period of study
- iv. To examine the document by type of research publication during the selected period of study
- v. To examine the subject wise distribution of research publication and institutional and countries collaboration
- vi. To find the most prolific authors of Gestational Diabetes Mellitus for a the selected period of study

FIGURE 1. DOCUMENT BY YEAR



The trend of annual publications and citations over 10 years presented in Figure1. There is a seamless progressive growth is found in both publication and citation counts. Upon analyzing extracted, publications growth is continuously increasing till 2016. This is found to be unexpectly enormous. Further to all –total citation were retrieved with average –citation per paper. The highest citation appeared in 2016. Over the study period publication is continuously increasing, whereas fluctuation trend is found in citation.

FIGURE 2. DOCUMENT BY SUBJECT AREA

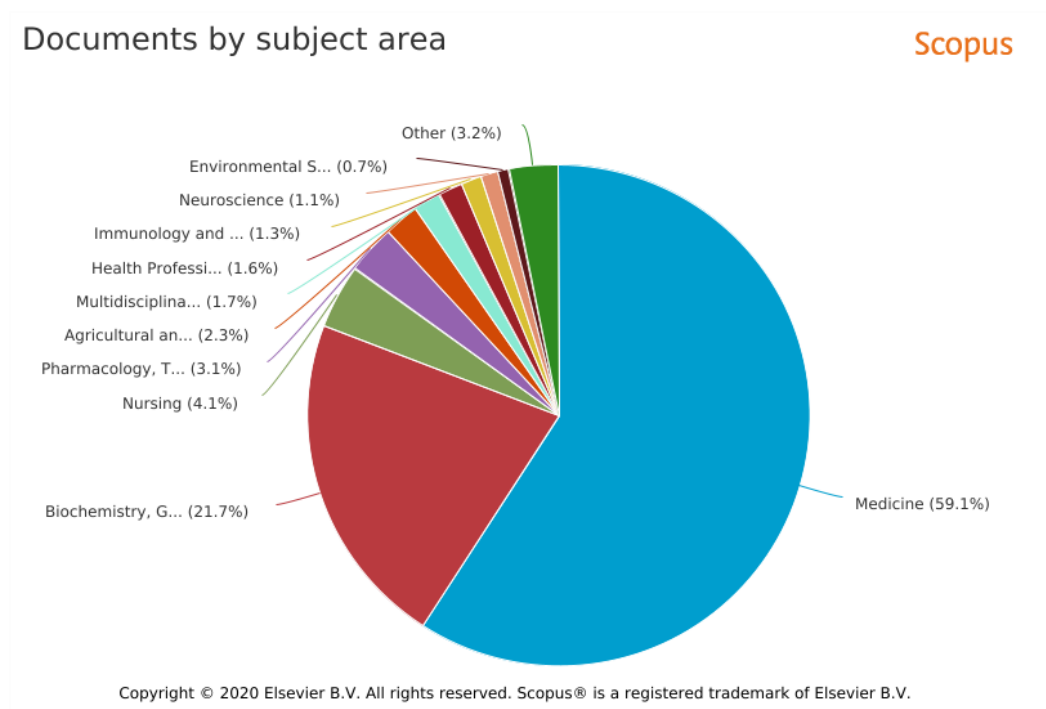


Fig 2 Shows the document of research articles about Gestational Diabetes Mellitus published by subject area..59.1 % were in the field of medicine, followed by biochemistry 21.7%.

FIGURE 3 . DOCUMENT PER YEAR BY SOURCE

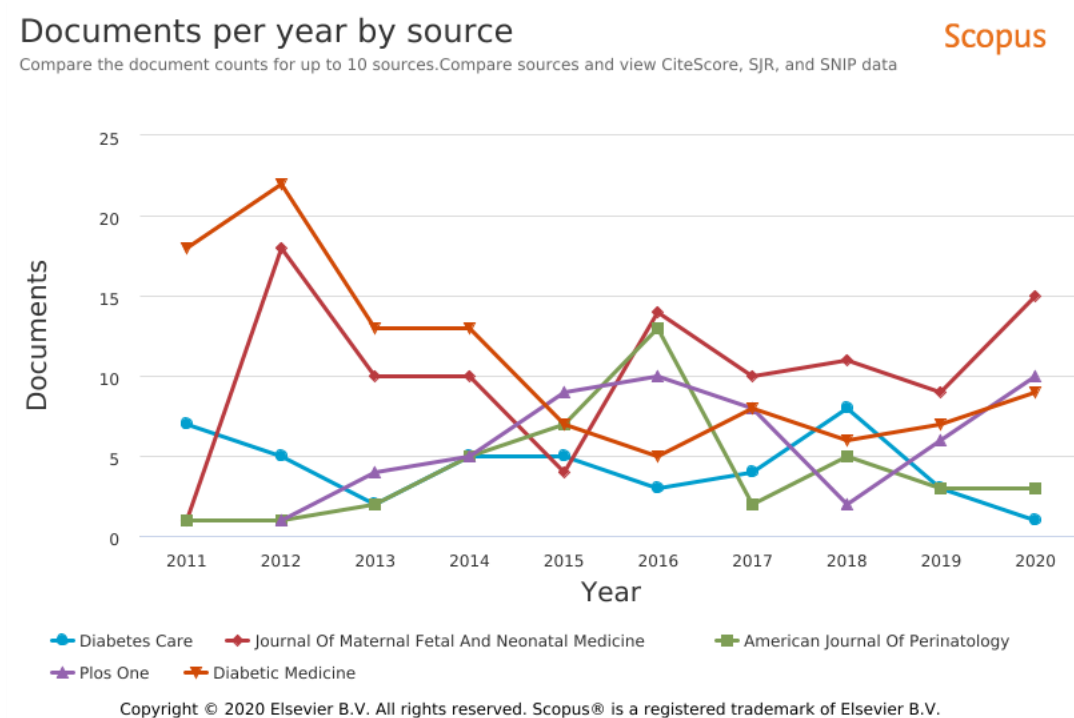


Figure 3 shows the top ten preferred sources. It is observed that the ten publications were published in the Diabetic Medicine .The finding revealed that academicians and researchers prefer to publish their research work with high impact volume.

Table 1: TOP TEN SOURCE TITLE

SI No.	Source	Country	TP	h-index	Cite Score	SJR	SNIP	IF
1	Diabetic Medicine	UK	108	132	6.1	1.52	1.220	3.257
2	Journal Of Maternal Fetal And Neonatal Medicine	UK	102	75	3.1	0.703	0.930	1.737
3	Plos One	USA	55	300	5.2	1.023	1.205	2.740
4	Diabetes Care	USA	43	346	22.3	6.480	4.581	16.019
5	American Journal Of Perinatology	USA	42	63	2.7	0.788	0.914	1.474
6	Diabetes Research And Clinical Practice	Ireland	42	107	5.4	1.402	1.582	4.568
7	Diabetologia	Germany	39	220	13.1	3.181	2.048	7.778
8	BMC Pregnancy And Childbirth	UK	38	75	3.8	1.275	1.469	2.587
9	Placenta	UK	31	118	5.1	1.147	0.964	3.146
10	Journal Of Clinical Endocrinology And Metabolism	USA	29	343	9.8	2.478	1.803	5.39

Data Source: Scopus Database

Table I shows the top ten source title. Diabetic medicine is the top one journal of source title with 108 publications and 132 h index followed by Journal of Maternal, Foetal and neonatal medicine with 102 publications.

Table II: TOP TEN HIGHLY CITED PUBLICATIONS

SI No.	Authors	Title	Year	Source Title	Citation
1.	American Diabetes Association	Standards of medical care in diabetes-2014	2014	Diabetes Care	3234
2.	American Diabetes Association	Standards of medical care in diabetes-2011	2011	Diabetes Care	2306
3.	[No author name available]	Standards of medical care in diabetes - 2012	2012	Diabetes Care	2114
4.	American Diabetes Association	Diagnosis and classification of diabetes mellitus	2012	Diabetes Care	1335
5.	Viollet, B. [et al].	Cellular and molecular mechanisms of metformin: An overview	2012	Clinical Science	989

6.	American Diabetes Association	Classification and diagnosis of diabetes	2017	Diabetes Care	856
7.	Nolan, C.J., Damm, P., Prentki, M.	Type 2 diabetes across generations: From pathophysiology to prevention and management	2011	The Lancet	550
8.	Kautzky-Willer, A., Harreiter, J., Pacini, G.	Sex and gender differences in risk, pathophysiology and complications of type 2 diabetes mellitus	2016	Endocrine Reviews	407
9.	Ma, R.C.W., Chan, J.C.N.	Type 2 diabetes in East Asians: Similarities and differences with populations in Europe and the United States	2013	Annals of the New York Academy of Sciences	357
10.	Hall, V., Thomsen, R., Henriksen, O., Lohse, N.	Diabetes in Sub Saharan Africa 1999-2011: Epidemiology and public health implications. A systematic review	2011	BMC Public Health	301

Data Source: Scopus Database

Table II shows top ten highly cited publications. Article titled, Standards of medical care in diabetes 2014 , published in Diabetic Care by American Diabetes Association is the most cited publication.

FIGURE 4. DOCUMENT BY COUNTRY

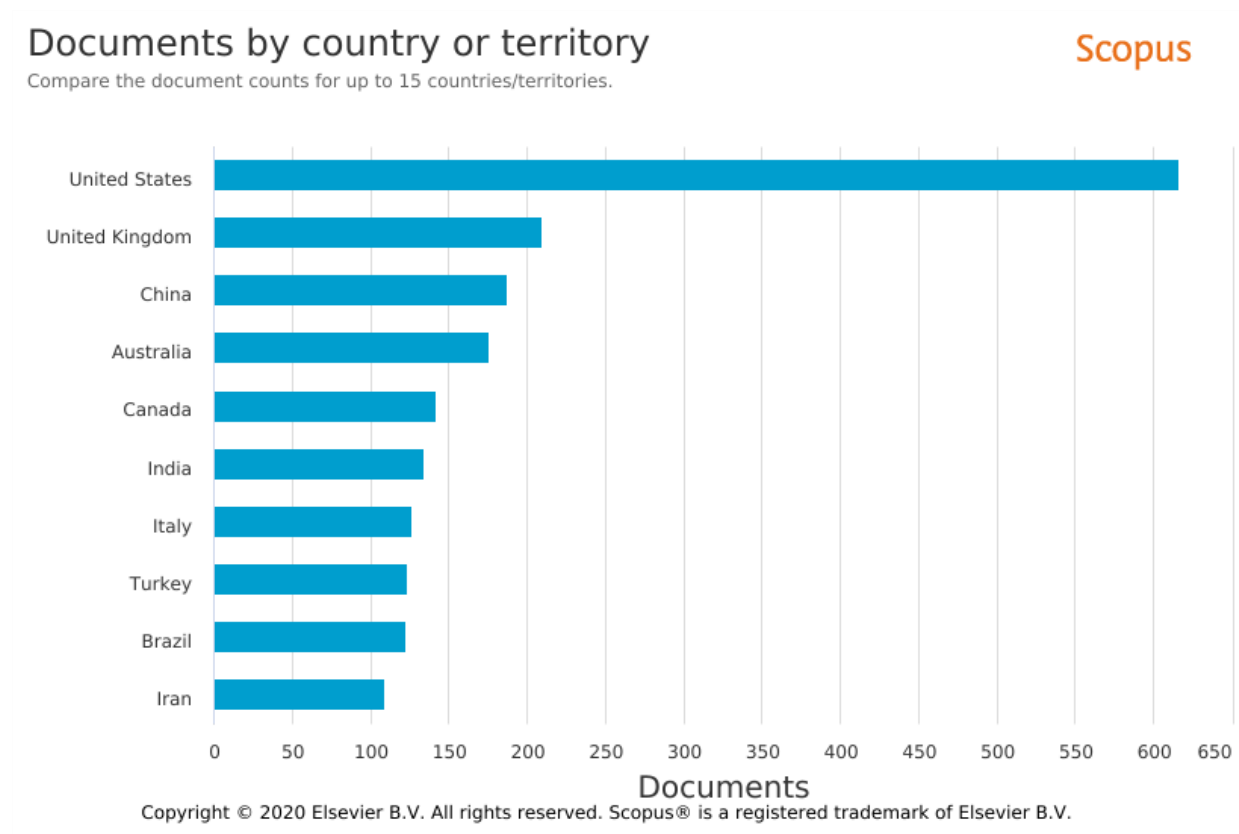


Figure 4 Analyses the document about Gestational diabetes mellitus by country wise. The leading countries published articles about GDM were United States and United Kingdom.

FIGURE 5. DOCUMENT BY AFFILIATION

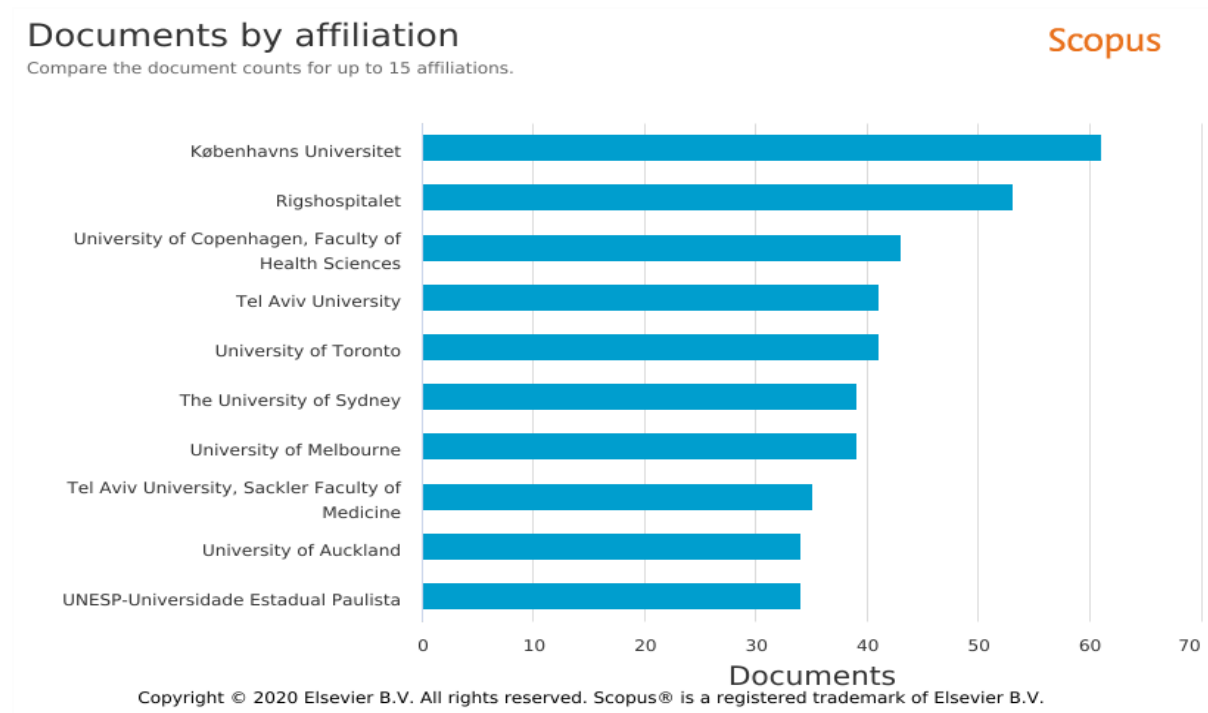


Figure 5 shows documents published by leading institution about Gestational Diabetes Mellitus in world. University of Copenhagen (Københavns Universitet), Denmark is in the top position in publishing research articles about Gestational Diabetes Mellitus.

FIGURE 6. DOCUMENT BY TYPE OF PUBLICATION

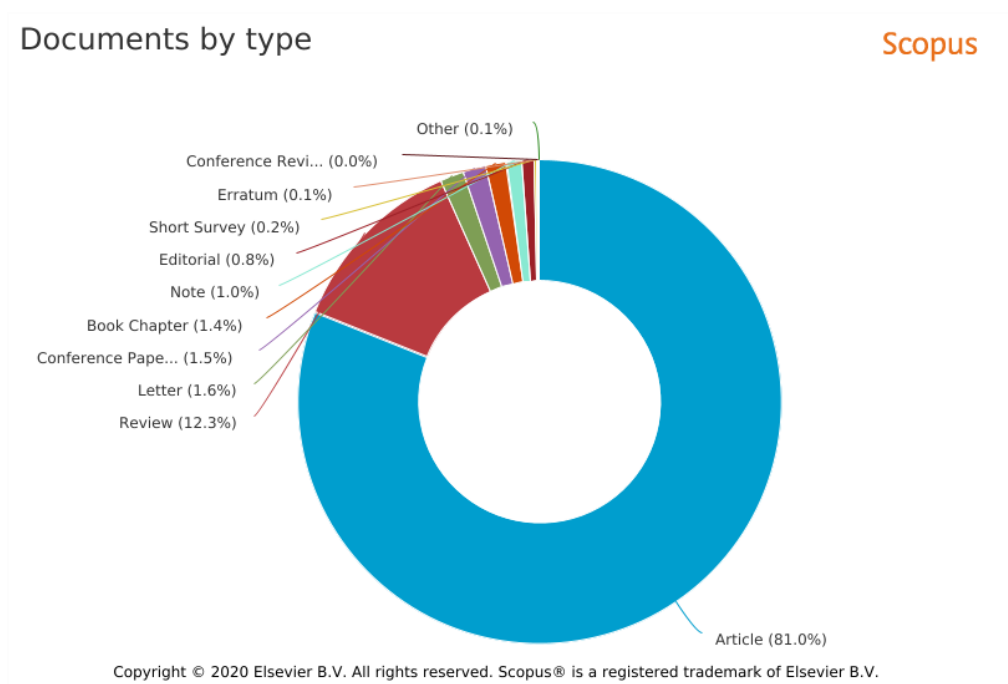


Figure 6 shows document by type of publications. 81 % were articles and 12.3 % were reviews. Others were letters 1.6%, conference paper 1.5%, book chapters 1.4 % notes 1.0%, Editorial 0.8%.

FIGURE7 DOCUMENT BY PROLIFIC AUTHORS

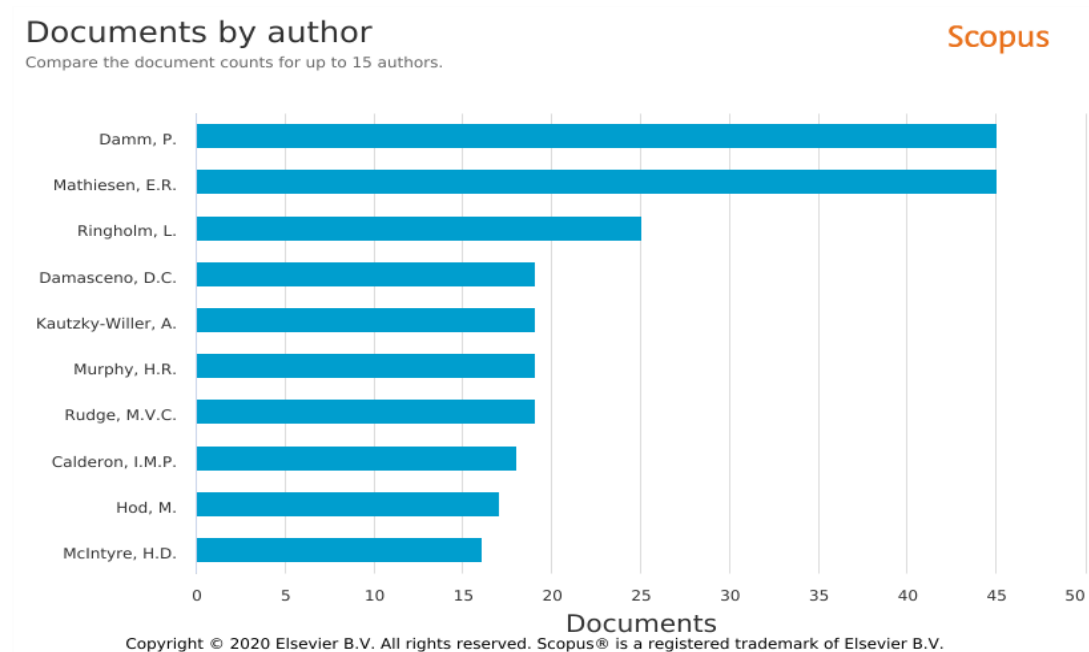
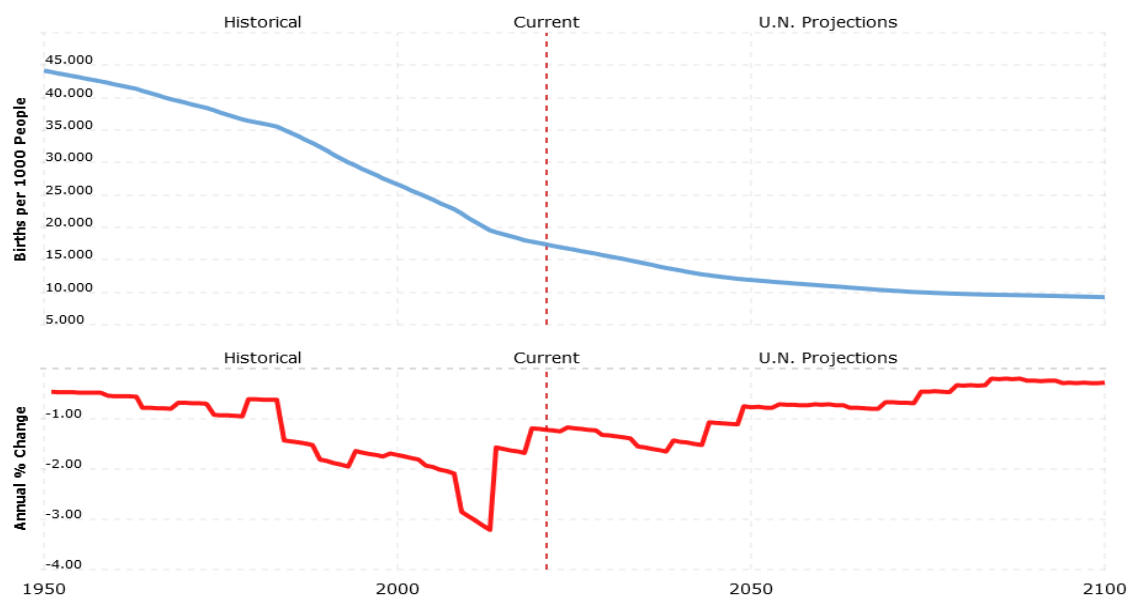


Fig 7 shows the research profile of most prolific authors of Gestational diabetes mellitus research. Five authors who contributed more than the group average were Damm P, Mathiesen E R, Ringholm L, Damasceno D C, Kautzky Willer A.

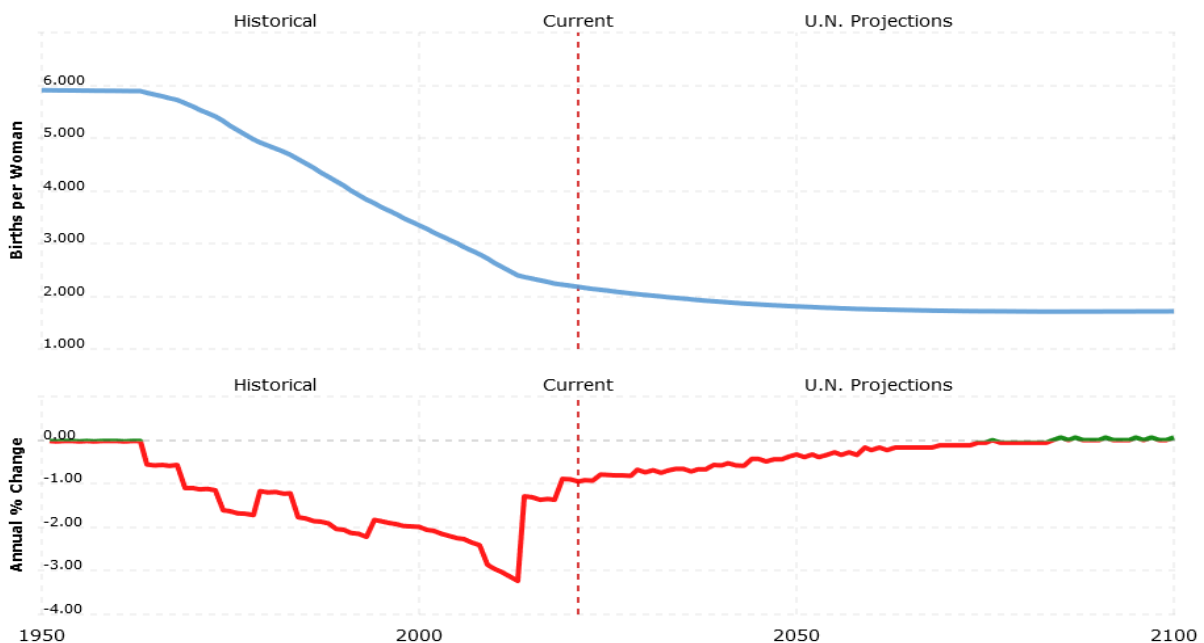
FIGURE 8: INDIA BIRTH RATE 1950-2021



. Data Source: [United Nations - World Population Prospects](#)

- The current birth rate for India in 2021 is **17.377** births per 1000 people, a **1.22% decline** from 2020.
- The birth rate for India in 2020 was **17.592** births per 1000 people, a **1.2% decline** from 2019.
- The birth rate for India in 2019 was **17.806** births per 1000 people, a **1.19% decline** from 2018.
- The birth rate for India in 2018 was **18.020** births per 1000 people, a **1.68% decline** from 2017.

FIGURE 9: INDIA FERTILITY RATE 1950-2021



Data Source: [United Nations - World Population Prospects](#)

- The current fertility rate for India in 2021 is **2.179** births per woman, a **0.95% decline** from 2020.
- The fertility rate for India in 2020 was **2.200** births per woman, a **0.9% decline** from 2019.
- The fertility rate for India in 2019 was **2.220** births per woman, a **0.89% decline** from 2018.
- The fertility rate for India in 2018 was **2.240** births per woman, a **1.37% decline** from 2017.

Findings

- The analysis acknowledges that 2016 is the most productive year with 20394 research papers.

- Article titled, Standards of medical care in diabetes 2014 , published in Diabetic Care by American Diabetes Association is the most cited publication.
- Diabetic medicine is the top one journal of source title with 108 publications and 132 h index followed by Journal of Maternal, Foetal and neonatal medicine with 102 publications.
- In the top 10 journal ranking list, Diabetic medicine is the topmost preferred source of publication of Gestational diabetes mellitus
- The highest number of publications, has appeared in medical discipline 59.1% and were in the form of articles 81%.
- The leading countries published articles about GDM were United States and United Kingdom.
- University of Copenhagen (Kobenhavns Universitet), Denmark is in the top position in publishing research articles about Gestational Diabetes Mellitus
- It is apparent during the study period Damm P, Mathiesen ER, Ringholm L, Damasceno D C, Kautzky Willer A. were found to be the most productive authors of gestational diabetes mellitus
- The current birth rate of India in 2021 is 17.377 birth per 1000 people and current fertility rate is 2.179 birth per women

CONCLUSION

The research output of Gestational diabetes mellitus has gradually increased and showed an exponential progress in later times. 81% of published document were articles and the maximum publications 59.1% was of medicine. Damm P, Mathiesen E R, Ringholm L, Damasceno D C, Kautzky Willer A. were found to be the most productive authors of gestational diabetes mellitus. The leading countries published articles about GDM were United States and United Kingdom. It is evident that India is only in sixth position in conducting and publishing research of Gestational Diabetes Mellitus. Wide variations in the prevalence of gestational diabetes mellitus (GDM), 1-21%, have been reported globally. The current birth rate of India in 2021 is 17.377 births per 1000 people and current fertility rate is 2.179 births per women. The studies shows that prevalence of gestational diabetes is 10-14% in India. India has the highest number of diabetics, however, no national data is available on the disease burden of GDM. This emphasizes the more research studies to be conducted in the field of Gestational Diabetes Mellitus to prevent the maternal and neonatal complications.

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